Liikennevirasto
Finnish Transport Agency

23eng · 2014
GUIDELINES OF THE
FINNISH TRANSPORT AGENCY

Laying and Marking of Overhead Cables and Submarine Cables and Pipelines in Water Areas

Laying and Marking of Overhead Cables and Submarine Cables and Pipelines in Water Areas

Guidelines of the Finnish Transport Agency 23eng/2014

Finnish Transport Agency
Helsinki 2014

Cover picture: Photo Archives of the Finnish Transport Agency

Online Publication, PDF (www.liikennevirasto.fi)
ISSN-L 1798-663X
ISSN 1798-6648
ISBN 978-952-317-237-1

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Liikennevirasto
Finnish Transport Agency

GUIDELINE

18 June 2015 Diary No 3255/090/2014

Supersedes
Instructions for Laying and Marking of Overhead Cables and Submarine bles and Pipelines in Water Areas by the Finnish Transport Agency (29.11.2010)

In effect
from 1 July 2014 until further notice

Key words
waterborne traffic, overhead cable, submarine cables and pipelines

Laying and Marking of Overhead Cables and Submarine Cables and Pipelines in Water Areas

This publication presents general instructions for Laying and Marking of Overhead Cables and Submarine Cables and Pipelines in Water Areas from the perspective of waterborne traffic and waterway maintenance.

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Foreword

This publication issued by the Finnish Transport Agency includes the general principles and instructions concerning the laying of overhead cables, submarine cables and pipelines and how they are marked and charted. In addition to overhead or submarine wires and cables across waterways, these instructions are also applied to other navigable areas.

In water areas, the objective is to lay cables and pipelines in such a manner that they cause no obstructions to waterborne traffic or waterway maintenance, and to mark them as appropriate so as to avoid any damage to cables and pipelines caused by waterborne traffic or waterway operations.

This publication replaces the corresponding instructions issued earlier "The Finnish Transport Agency's Instructions on Laying and Marking of Overhead Cables, Submarine Cables and Pipelines in Water Areas" (Record no. 6155/040/2010, 29 Nov. 2010). The update takes account of, for example, the amendments in the new Water Act (587/2011).

Issues related to waterway signs are presented in more detail in the Finnish Transport Agency's regulation on waterway signs and light signals and positioning thereof (Record no. 6154/040/2014). The Finnish Transport Agency has issued separate instructions on safe overhead clearance for overhead cables "Recommendations on Safe Overhead Clearance for Overhead Cables" (Finnish Maritime Administration 2006).

Helsinki, June 2014

Finnish Transport Agency
Maintenance Department

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1 Laying of Overhead Cables in Water Areas

Pursuant to the provisions in Chapter 3 of the Water Act (587/2011) a permit in accordance with the Water Act must be applied for from the Regional State Administrative Agency if a wire obstructs waterborne traffic in an area.

It is recommended that the constructor of an overhead cable check with the Finnish Transport Agency in as early stages of planning as possible what is the safe overhead clearance for cables required by waterborne traffic in the area in question.

Safe overhead clearances (headroom) for cables required by waterborne traffic are presented in the Finnish Transport Agency's instructions "Recommendations on Safe Overhead Clearances for Overhead Cables" (Finnish Maritime Administration publication 4/2006). In addition to the recommendations on safe overhead clearances, the publication also includes instructions on how to mark overhead cables at sea and on nautical charts. The recommendations apply to channels and other navigable water areas.

At the Finnish Transport Agency, the contacts in matters relating to overhead cables are the agency's units for sea channels and inland waterways.

2 Laying of Submarine Cables and Pipelines

Pursuant to Chapter 3 of the Water Act (Chapter 3, Section 3, Subsection 1 (4)), construction of a water, sewer, power or other line under a general or main channel is always subject to a permit in accordance with the Water Act. A permit is also regarded necessary if the cable or line runs in the channel area, even if it did not cross the channel. A permit may be needed also even if there was no general or main channel in the area if the case is a situation referred to in Chapter 3, Section 2 of the Water Act, in which the project "*may cause changes in the state, depth, water level or flow, shore, or aquatic environment of a water body or the quality or quantity of groundwater",* and this change causes damage, harm or loss of benefit referred to in Section 2. An applicant may contact the regional Centre for Economic Development, Transport and the Environment (ELY Centre), which acts as supervising authority in these matters, for a statement on whether a permit is needed.

It is recommended that the constructor contact the Finnish Transport Agency already in the planning stages of cable or pipeline alignment to find as unobstructed alignment with a view to waterborne traffic as possible. At the same time, it is also possible to conduct a preliminary survey of how to mark the cable or pipeline at sea, if needed.

At the Finnish Transport Agency, the contacts in matters relating to cables and pipelines are the agency's units for sea channels and inland waterways.

If the cable, wire or pipeline work to be performed in the Finnish territorial waters requires systematic seabed survey or recording of such data, a permit in accordance with the Territorial Surveillance Act (755/2000) must be applied for from the Defence Command. If the work is performed in a restricted area, it always requires a permit from the military unit responsible for the restricted area in question.

Factors to be taken into consideration in the planning and laying of cables and other submarine pipelines:

- When making alignments for cables and pipelines, channel areas and anchorage areas in particular should be avoided. Cables or pipelines may not be laid in anchorage areas marked in nautical charts.

- If it is necessary to take a cable or pipeline across a channel, the submarine passage should be as short as possible, or transversely across the channel.

- In a channel area, a cable or a pipeline is placed as deep as possible so that the cable in its entirety is at least below the secured water depth, or the safe clearance depth. Safe clearance depth = authorised draught + gross underkeel clearance. In channels, the gross underkeel clearance is around 15–20 per cent of the authorised draught or at least 0.6 metres.

- If necessary, a cable or a pipeline is weighed in a water area in such a manner that it does not under any circumstances – for example, at the impact of propeller currents – rise above the safe clearance depth, or secured water depth in the channel.

- In a channel area, a cable or a pipeline is placed in the seabed by digging, if necessary. The need to do so depends on, for example, the depth of water or the channel, traffic in the channel, the type of the cable/pipeline, and the magnitude of the risk of damage. The cable or pipeline shall be dug into the ground also in waterfront boundary areas.

- One option is to use directional drilling techniques to install the cable, in which case no weighing or digging is needed.

- Future channel projects (new channels, deepening of existing channels, and maintenance dredging of waterways) should also be taken into account in the laying of cables and pipelines in such a manner in particular that they will not be placed in future dredging areas or in their immediate vicinity.

- When laying cables and pipelines, any floating aids to navigation should be circumvented at a sufficient distance. The radius of an anchorage area required for buoy maintenance extends approximately 150 metres around the buoy. The maintenance of spar buoys requires a free area of approximately 40 metres. In case of spar buoys, the constructors should also strive for a similar distance of circumvention as with buoys if it can be expected that the sign might be replaced with a
-
- All installation work should be performed aiming at causing as little obstruction to waterborne traffic as possible.

More detailed data on channels (channel alignment and channel areas) and aids to navigation, and safe clearance depths is available from the Finnish Transport Agency's units for sea channels and inland waterways.

Detailed data on watercourse depth surveys on planned cable or pipeline routes can be requested from the Finnish Transport Agency.

3 Marking at sea

In the marking of overhead cables and submarine cables and pipelines, the Finnish Transport Agency's regulations relating to waterway signs and light signals shall be applied (6154/040/2010, 12 Nov. 2010). In addition, a permit granted by the Finnish Transport Agency is required for positioning of waterway signs (Decree on the Buoyage of Waterways, 30 Nov.1979/846, Section 5).

The owner or constructor of the wire, cable or pipeline is responsible for the marking and the maintenance thereof at its own expense.

More detailed instructions on the marking practices (e.g. positioning and size of the signs, markings to be used in the signs, and also on the need of marking in general) is available at the Finnish Transport Agency's units for sea channels and inland waterways.

Furthermore, in projects for which a water permit has been applied for, the regulations included in the Regional State Administrative Agency's permit decision shall also be followed in placing of signs.

3.1 Marking of Overhead Cables

The starting point is that any overhead cables crossing a watercourse that obstruct waterborne traffic shall be marked. The Finnish Transport Agency communicates its stand on whether an overhead cable needs to be marked in connection with the statements concerning the construction of an overhead cable and the safe overhead clearance.

The location of an overhead cable is marked using an informative sign with a lightning symbol. In addition, a sign “Rajoitettu alikulkukorkeus” (Restricted overhead clearance) is used, showing the safe overhead clearance in metres. The sign can be equipped with an additional sign showing the effective direction.

The restricted overhead clearance sign is placed above the sign for overhead cable. The signs can be placed on either the right-hand side of the direction of voyage or on both sides of the channel or main waterway at the point where the wire alignment crosses the channel or main channel if there is no public channel in the area.

The restricted overhead clearance sign can also be attached directly to the overhead cable. In this case, no overhead cable sign is used.

An additional sign may be used below the overhead cable sign to indicate overhead cable voltage of over 400 volts.

The signs are placed in such a manner that they can be easily seen from an approaching vessel so that the vessel may turn back or stop well before the overhead cable.

3.2 Marking of Submarine Cables and Pipelines

It is necessary to mark submarine cables and pipelines to avoid any unintentional damage to them and any accidents they might cause to others.

From the perspective of waterborne traffic, the need to mark them is decided in accordance with the following principles:

- As a rule, any submarine cables or pipelines crossing a channel or otherwise running in the channel area are always marked.
- In other navigable water areas, submarine cables and pipelines are marked according to circumstances and necessity.
- If directional drilling is used for implementing the submarine passage across the whole width of the channel, no cable or pipeline signs are needed to mark the cable or pipeline.

In addition to the Finnish Transport Agency's regulations concerning waterway signs, the following instructions shall be applied in the placing of cable and pipeline signs and directional signs:

Cable and pipeline signs

If a submarine cable or pipeline runs directly across a waterway, a cable or pipeline sign shall be placed on both shores of the waterway perpendicular to the direction of the cable or pipeline in such a way that a vertical line drawn between the signs shows the location of the cable or pipeline. If a cable or pipeline winds around in the watercourse, the signs indicatethe crossing point of the channel and the cable or pipeline in particular.

A cable or pipeline sign is made of the same materials as other waterway signs or some other suitable material, such as plank wood. The sign is placed on supports at a sufficient height.

In a narrow passage, every adjacent cable or other pipeline does not need to be marked separately. In such a case, signs are posted at each end of the area, specifying the type of the cables or pipelines, such as “KAAPELEITA SALMESSA 2000 m” or “KABLAR I SUNDET 2000 m” (Cables in the sound for next 2000 m).

Directional signs

If necessary, directional signs are used to indicate the crossing point of the channel and a cable or wire if this cannot be indicated clearly enough using cable or pipeline signs. If possible, directional signs are posted on the shore closest to the channel. The lower directional sign is placed as close to the shore as possible and the upper directional sign at such a distance from the other one that corresponds with approximately 1/20 part of the distance between the channel and the lower directional sign, unless due to circumstances a smaller distance must be used.

The principles concerning marking of cables using cable signs and directional signs are shown in the drawings in Appendix 3.

3.4 Lighting of Signs

Any overhead cables crossing a harbour area, general anchorage area or a lighted channel as well as signs and directional signs indicating cables crossing such areas shall be illuminated during the dark hours of the day if this is possible at reasonable expense.

In a directional sign, the light used shall be of the same colour as the middle part of the sign. Red light shall be used in the lower directional sign, and a red light with a white light under it in the upper directional sign. A spotlight is used for lighting the signs.

4 Notifications

An advance notification shall be made to the Finnish Transport Agency on any construction or installation work of overhead cables or submarine cables and pipelines in channel areas or other watercourses used by waterborne traffic for the purpose of issuing notifications and warnings for seafarers. At the same time, potential special arrangements concerning waterborne traffic during construction can be preliminarily agreed upon, such as notifications and temporary markings at sea. These procedures will be specified further as needed during construction.

Information on completed overhead cables or submarine cables and pipelines is submitted to the Finnish Transport Agency for having them marked on the nautical charts and included in the publication "Notices to Mariners". A notification on overhead cables is made every time a cable crosses a public channel marked on nautical charts. It is also advised that a notification is made on any other overhead cables of significance for waterborne traffic. A notification on submarine cables and pipelines shall be submitted if they are located in navigable water areas.

However, it is at the owner's discretion whether notification is made on telephone cables and power cables with voltage of 400 volts or less or heat collection pipes or other wires of lesser importance placed at the bottom of the sea, as well as any cables and pipes laid using directional drilling.

It is recommended that the notification be submitted using forms in accordance with appendices 1 and 2 to these instructions (Appendix 1 for overhead cables, Appendix 2 for submarine cables and pipelines), which specify the information needed for the notification. A map extract shall be attached to the notification, showing the location of the built line or cable. The map extract shall be based on the National Land Survey of Finland's topographic map or the Finnish Transport Agency's nautical chart. In addition to the map extract, it is also requested that the location be specified using a list of coordinates. In addition to the coordinate points indicating the passage of the wire, the coordinate system used must also be specified in the list of coordinates. Primarily, the use of the national coordinate systems EUREF-FIN or ETRS-TM35FIN is recommended. The list of coordinates should be primarily submitted electronically either as a text file or in a generally used spreadsheet format.

In addition to the above, the location may also be reported using a Geographic Information System or planning software file. The file itself or its dispatch note shall specify the coordinate system used. The recommended file formats are shapefile or DXF.

The locations of waterway signs used for marking the line or cable shall also be marked on the map extract. The information on waterway signs is saved in the aids of navigation register maintained by the Finnish Transport Agency.

Depending on the location, notifications on the construction and completion of projects shall be submitted to the Finnish Transport Agency's unit for sea channels or the unit for inland waterways

The constructor of the wire, cable or pipeline is responsible for any other notifications, for instance in local newspapers, in accordance with regulations of the permit decision issued in accordance with the Water Act.

A notification to the Finnish Transport Agency shall also be made on removal of a wire, cable or pipeline for having these changes marked on the nautical chart and included in the publication “Notices to Mariners”. In connection with the notification, it shall also be specified whether the cable or pipeline has been physically removed or only removed from service. The waterway signs for any lines or cables being removed shall also be removed at the same time or changed so as to comply with the new situation. The Finnish Transport Agency must be notified of such changes for the purpose of updating the register data in the database.

5 Marking on Nautical Charts

Overhead cables and submarine cables and pipelines shall be marked on nautical charts using map symbols used in the Finnish nautical charting system in accordance with the Finnish Transport Agency's publication Nautical Chart Symbols, Map 1 (2010). The location and passage of wires and cables shall be charted in accordance with the information provided in the notifications on completion of construction.

The chart symbols used on Finnish nautical charts are presented in Appendix 4.

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APPENDIX 1

NOTIFICATION ON COMPLETION OF AN OVERHEAD CABLE CROSSING A WATERWAY

Owner information	
Owner	**Address**
Contact person	**Telephone number and e-mail address**

Information on overhead cable	
Name of the project/Project description	
Municipality	**Number of the water permit decision**
	Date of completion
Type of overhead cable ☐ power/electric cable ☐ telephone/data transmission cable ☐ other type of wire	**Safe overhead clearance (Headroom) (m)**
	Water reference level
	Power/electric cable voltage
Information on marking (such as location/coordinates of signs)	

Other information

Appendices

- ☐ map extract
- ☐ coordinate data (coordinates, coordinate system)
- ☐ other attachments

Date and place	**Signature and name in print**

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APPENDIX 2

NOTIFICATION ON COMPLETION OF A SUBMARINE CABLE OR PIPELINE CROSSING A WATERCOURSE

Owner information	
Owner	**Address**
Contact person	**Telephone number and e-mail address**

Information on cable/pipeline	
Name of the project/Project description	
Municipality	
Type of cable/pipeline ☐ power/electric cable ☐ telephone/data transmission cable ☐ water pipe ☐ sewer ☐ other cable or pipeline	**Number of the water permit decision** **Date of completion** **Power/electric cable voltage**
Information on marking (such as location/coordinates of signs)	

Other information

Appendices

☐ map extract

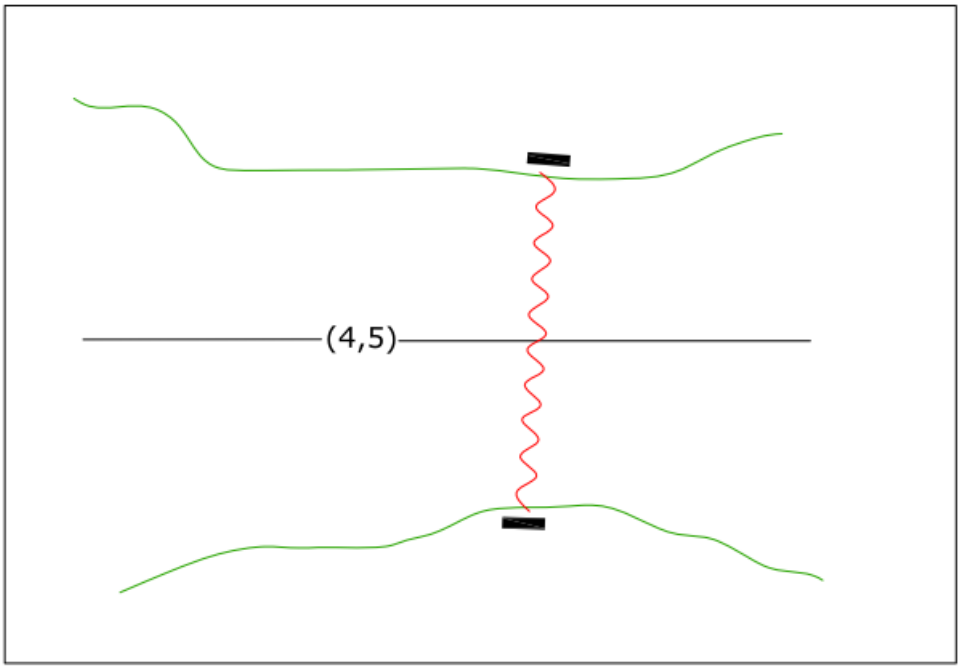
☐ coordinate data (coordinates, coordinate system)

☐ other attachments

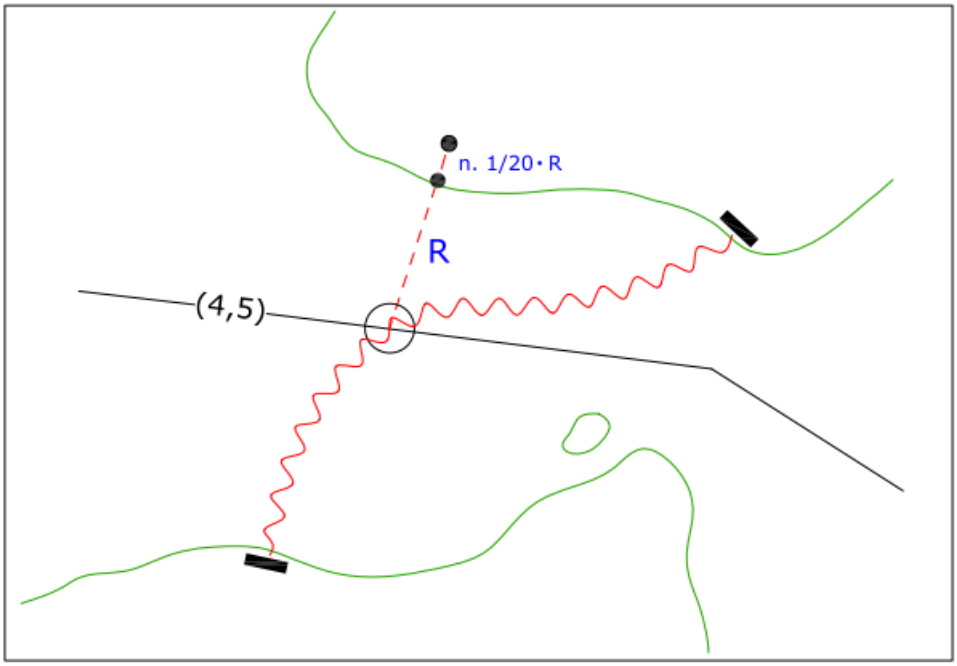
Date and place	**Signature and name in print**

MARKING OF A CABLE OR PIPELINE

Case A: Cable and pipeline signs



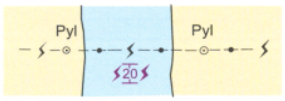
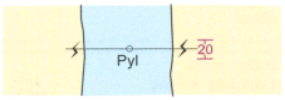
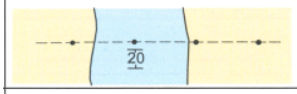
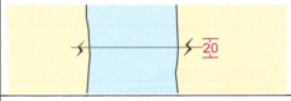
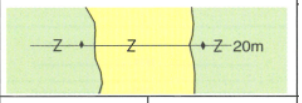
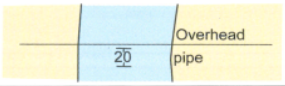
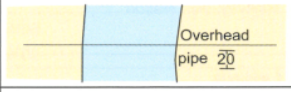
Case B: Cable and pipeline signs and directional signs



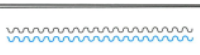
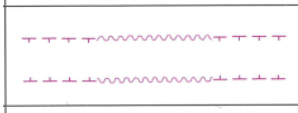
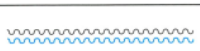
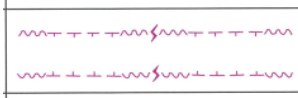
Symbols used in nautical charting

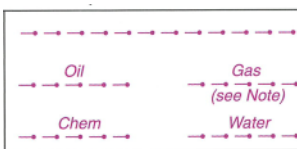
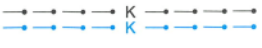
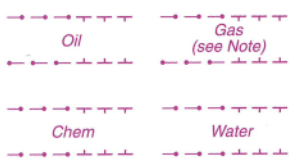
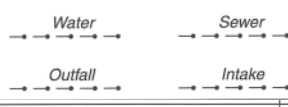
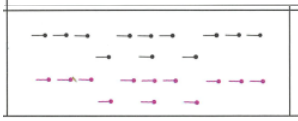
Source: Nautical Chart Symbols, Map 1 (Finnish Transport Agency 2010, ISBN 978-952-255-758-2)

OVERHEAD CABLES

INT-kartta INT-kort INT chart		Sininen merikartta Blått sjökort Modern Finnish chart	Vihreä merikartta Grönt sjökort Traditional Finnish chart
	Voimansiirtojohto, pylväitä sekä alikulkukorkeus Kraftledning med mast och fri höjd *Power transmission line with pylons and safe overhead clearance*		
	Ilmajohto, puhelin- tai lennätinkaapeli Teleledning *Overhead cable, Telephone line, Telegraph line*		
	Ilmassa kulkeva putki Rörledning över vatten *Overhead pipe*		

CABLES AND OTHER SUBMARINE PIPELINES

INT-kartta INT-kort INT chart		Sininen merikartta Blått sjökort Modern Finnish chart	Vihreä merikartta Grönt sjökort Traditional Finnish chart
	Vedenalainen kaapeli Undervattenskabel *Submarine cable*		
	Vedenalainen kaapelikenttä Område för undervattenskablar *Submarine cable area*		
	Vedenalainen voimakaapeli Undervattenskabel, el *Submarine power cable*		
	Vedenalainen voimakaapelialue Område för undervattenskablar, el *Submarine power cable area*		
	Käytöstä poistettu vedenalainen kaapeli Undervattenskabel, ej i bruk *Disused submarine cable*		

	Siirto- ja jakeluputki: täsmentämätön öljy-, kaasu-, kemikaali- ja vesiputki Ledning: ospesificerad olje-, kemikalie-, gas- och vattenledning *Supply pipeline: unspecified, oil, gas, chemicals, water*		
	Siirto- ja jakeluputkialue: täsmentämätön öljy-, kaasu-, kemikaali- ja vesiputki Område med ledningar: ospecificerad olje-, kemikalie-, gas- och vattenledning *Supply pipeline area: unspecified, oil, gas, chemicals, water*		
	Vesijohto, viemäri, laskuputki, ottoputki Rörledning för vatten, avlopp, utlopp eller intag *Outfall and intake: unspecified, water, sewer, outfall intake*		
	Käytöstä poistettu putkijohto Rörledning ej i bruk *Disused pipeline/pipe*		

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ISSN-L 1798-663X
ISSN 1798-6648
ISBN 978-952-317-237-1
www.liikennevirasto.fi